

SATO *et al.*, SN 10/797,013
Amdt. dated 12/21/2004
Reply to OA mailed 09/21/2004

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IN THE CLAIMS:

1. (Currently Amended) A ~~liquid crystal~~ display panel comprising:
a display unit comprising pixel elements arranged in a matrix;
a scanning circuit and a signal circuit arranged to drive pixel elements;
a multi-input type level conversion circuit arranged to generate control signals,
and to perform level conversion of image signals having a low voltage amplitude into
image signals having a high voltage amplitude to the scanning circuit and the signal
circuit to drive the pixel elements;

a differential input type level conversion circuit arranged to perform level
conversion of differential clock signals having a low voltage amplitude into clock
signals having a high voltage amplitude to control transmission of image signal
signals to the signal circuit to drive the pixel elements; and

a latch circuit arranged to latch the image signals having the high voltage
amplitude to the signal circuit in accordance with the clock signals having the high
voltage amplitude;

wherein the signal circuit and the scanning circuit are driven to provide a
visual display of images corresponding to the image signals latched from the latch
circuit in accordance with the control signals generated from the multi-input type
level conversion circuit.

2. (Currently Amended) A ~~liquid crystal~~ display apparatus according to claim
1, wherein the differential input type level conversion circuit comprises:

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a first transistor and a second transistor connected in parallel, having respective gate electrodes coupled to receive a bias voltage; and

a first resistance element and a second resistance element connected in parallel, and disposed between respective drain electrodes of the first transistor and the second transistor and a power supply terminal;

wherein respective source electrodes of the first transistor and the second transistor are coupled to receive clock signals having a mutually different polarity and a low voltage amplitude, and the respective drain electrodes of the first transistor and the second transistor are coupled to output clock signals having a mutually different polarity and a high voltage amplitude.

3. (Currently Amended) A liquid-crystal display apparatus according to claim 2, wherein the differential input type level conversion circuit further includes a waveform shaping unit for shaping a waveform of clock signals having the high voltage amplitude, and comprising:

a third transistor and a fourth transistor connected in parallel, having respective gate electrodes connected to respective drain electrodes of the first transistor and the second transistor, and

a fifth transistor and a sixth transistor connected in parallel, having respective drain electrodes connected to respective drain electrodes of the third transistor and the fourth transistor, and having respective source electrodes connected to a ground terminal,

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wherein respective source electrodes of the third transistor and the fourth transistor are coupled to a power supply terminal, and respective gate electrodes of the fifth transistor and the sixth transistor are connected to respective drain electrodes of the sixth transistor and the fifth transistor.

4. (Currently Amended) A ~~liquid-crystal~~ display apparatus according to claim 3, wherein the bias voltage is equal to a sum of a peak voltage of clock signals having the low voltage amplitude and a threshold voltage of the first transistor and the second transistor.

5. (Currently Amended) A ~~liquid-crystal~~ display apparatus according to claim 1, wherein the differential input type level conversion circuit comprises:

a plurality of transistors each having a gate electrode coupled to receive a bias voltage; and

a plurality of resistance elements each connected between a drain electrode of a respective transistor and a power supply terminal;

wherein each of the control signals is inputted to a source electrode of a respective transistor;

wherein each of the control signals is outputted from the drain electrode of a respective transistor; and

wherein amplitudes of the output control signals are higher than amplitudes of the input control signals.

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6. (Currently Amended) A ~~liquid-crystal~~ display apparatus according to claim 5, wherein each resistance element is comprised of a transistor having a gate electrode biased to a bias voltage.

7. (Currently Amended) A ~~liquid-crystal~~ display apparatus according to claim 6, wherein the bias voltage is equal to a sum of a peak voltage of the input control signals and a threshold voltage of the transistors.